TEXAS AGRICULTURAL EXPERIMENT STATION

BULLETIN NO. 182 NOVEMBER, 1915

DIVISION OF ANIMAL HUSBANDRY

STEER FEEDING

POSTOFFICE:
COLLEGE STATION, BRAZOS COUNTY, TEXAS

AUSTIN, TEXAS
Von Boeckmann-Jones Co., Printers
1915

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BY

JOHN C. BURNS, B. S.
Animal Husbandman, Feeding Investigations

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*As of November 1, 1915.
**In Cooperation with the United States Department of Agriculture.

STEER FEEDING

BY

JOHN C. BURNS, B. S., ANIMAL HUSBANDMAN, FEEDING INVESTIGATIONS.

OBJECT OF EXPERIMENT.

The object in view in conducting this experiment was as follows:

1. To compare cotton seed meal and cold pressed cotton seed in supplementing silage for fattening cattle.
2. To determine the advisability of supplementing cotton seed meal and silage with grain for fattening cattle.
3. To compare rice bran and ground milo heads in supplementing cotton seed meal and silage for fattening cattle.
4. To determine the value of shelter in fattening cattle.

CATTLE USED.

The cattle used were sixty high grade, range bred, two-year-old Hereford steers, purchased from Mr. J. E. Boog-Scott, Coleman, Texas. They were quite a uniform lot, very good in quality, but rather thin in condition when they arrived at College Station September 27, 1913. The following morning, having had access to water and hay through the night, they averaged 703 pounds. Based on this weight, they cost us, delivered, $6.50 a hundredweight or $45.70 a head. From September 28 to November 10, a period of 43 days, they were carried on pasture only, the cost of which, figured at 25 cents a head a month, was 36 cents a head. November 10, they were divided into five lots of twelve each, and from the evening of that day until the morning of November 12, all lots were confined in the pens in which the experiment was conducted and fed alike on corn silage. The amount of silage consumed during this brief period was 72 pounds a head, which, at $3.00 a ton, cost 11 cents.

The weight of the cattle November 12, the date of the beginning of the experiment, showed that they averaged 763 pounds, which meant a gain of 60 pounds a head since September 28. The cattle had cost us to this time, including initial cost and value of pasture and silage, $46.17 a head. Therefore, the cost per hundredweight at this time was $6.05.

FEEDS USED.

All feeds used were of good quality, but no better than can ordinarily be obtained by feeders generally. Samples were submitted to the Chemistry Division of the Experiment Station for analysis and their reports show that the average composition of each feed was as follows:

TABLE 1.

Feeds.	Water.	Percentage Composition.					Analysis Numbers
		Ash.	Protein.	Crude Fiber.	Nitrogen free extract.	Fat	
Cotton seed meal	8.59	5.35	44.94	8.52	25.09	7.49	7983 8129 8241
Cold pressed cotton seed	9.74	4.12	25.74	23.37	28.26	8.76	7984 8128 8244
Rice bran	8.93	7.81	13.84	9.26	47.38	12.78	8242
Ground milo heads	12.79	3.04	8.63	6.60	66.58	2.34	8112 8127 8243
Corn silage	72.21	1.93	2.16	8.11	14.97	.60	7979 8114 8126
Sorghum silage	69.03	2.16	1.99	4.75	21.19	.88	8240

Based on the analyses given in Table 1, the digestible nutrients in each feed are presented in Table 2.

TABLE 2.

Feeds.	Dry matter in 100 lbs.	Digestible Nutrients in 100 pounds.		
		Protein.	Carbohydrates.	Fat.
Cotton seed meal	91.41	38.61	19.33	7.10
Cold pressed cotton seed	90.26	19.12	27.11	7.53
Rice bran	91.07	8.90	40.58	10.33
Ground milo heads	87.21	5.47	57.57	1.74
Corn silage	27.79	1.08	15.60	.46
Sorghum silage	30.97	.18	16.31	.49

The prices for feeds, on which all calculations herein are based, except where otherwise specified, were as follows:

Cotton seed meal ..... $28 00 a ton.
Cold pressed cotton seed ..... 23 00 a ton.
Rice bran ..... 16 70 a ton.
Ground milo heads ..... 20 00 a ton.
Corn silage ..... 3 00 a ton.
Sorghum silage ..... 3 00 a ton.

PLAN OF EXPERIMENT.

As previously stated, November 10, the steers were divided into five lots of twelve each, and as the division was made as equally as possible

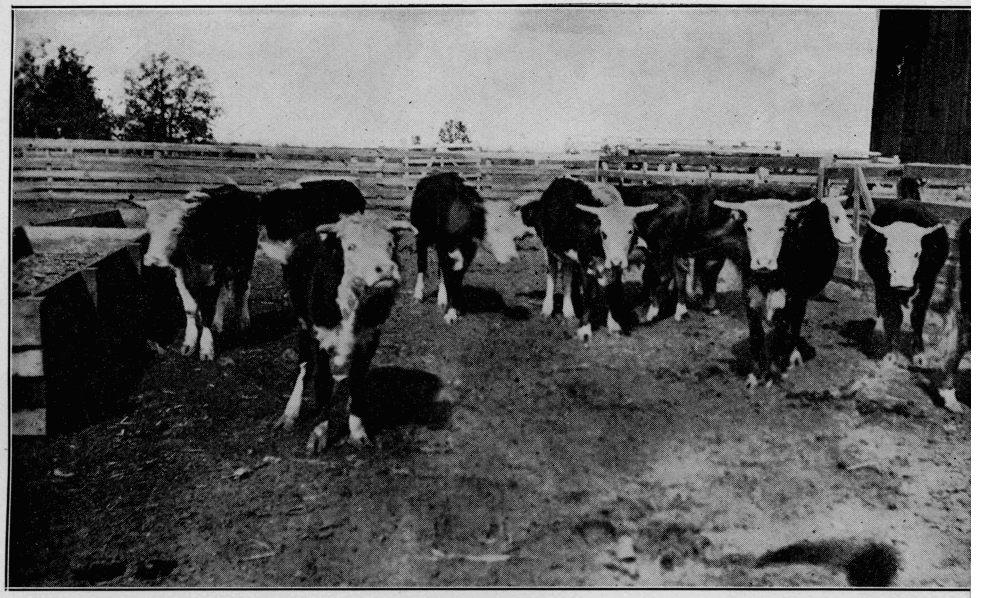

PLATE 1—THE STEERS OF LOT 1 AT THE BEGINNING OF THE EXPERIMENT.

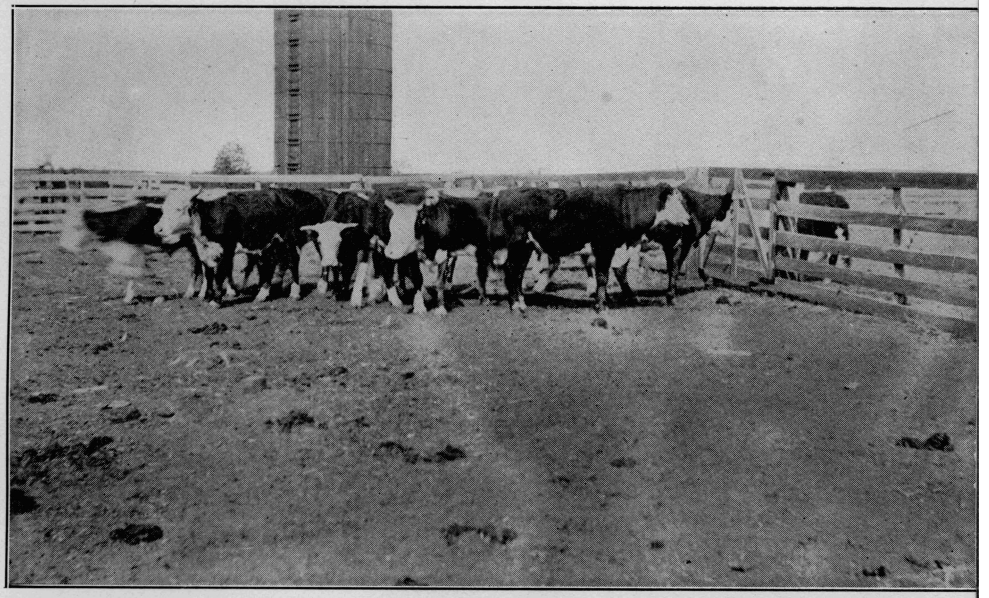

PLATE 2—THE STEERS OF LOT 2 AT THE BEGINNING OF THE EXPERIMENT.

in respect to conformation, quality, and condition, all lots were quite uniform at the beginning of the test.

Except in the case of Lot 5, which was provided with a shed 14x36 feet, open on the south side, the pens in which the steers were confined and fed were equal in all respects. They were 60x100 feet each in area and entirely unprotected from the weather. Each was provided with a galvanized iron water trough in which water from a deep well was kept before the cattle at all times. Granular salt was kept in a small trough in the corner of each pen so that the cattle had free access to it throughout the test.

The five lots were fed as follows:

Lot 1. Cotton seed meal and silage.
Lot 2. Cold pressed cotton seed and silage.
Lot 3. Cotton seed meal, silage, and rice bran.
Lot 4. Cotton seed meal, silage, and ground milo heads.
Lot 5. Cotton seed meal and silage with shelter.

Shoats were placed in the pens with Lot 3, which received rice bran, and with Lot 4, which received ground milo heads.

The cattle were fed regularly twice daily, early in the morning and late in the afternoon, and the feeds composing each ration were carefully weighed and thoroughly mixed together in the feed troughs.

Weights of each lot were obtained every day for three successive days, both at the beginning and at the end of the experiment, and the initial and final weights, herein recorded, are the average of the three initial and the three final weights, respectively. Each lot was weighed once every thirty days. The weighing was always done between 10 and 11 o'clock A. M.

THE FEEDING TEST.

The test covered a period of 140 days, from the evening of November 12, 1913, to the morning of April 1, 1914. The average daily rations, after the first two or three days in getting the cattle accustomed to eating, were, for a short period, as follows:

Lot 1. 3 pounds cotton seed meal, 40 pounds corn silage.
Lot 2. 6 pounds cold pressed cotton seed, 40 pounds corn silage.
Lot 3. 3 pounds cotton seed meal, 40 pounds corn silage, 4 pounds rice bran.
Lot 4. 3 pounds cotton seed meal, 40 pounds corn silage, 5 pounds ground milo heads.
Lot 5. Shelter, 3 pounds cotton seed meal, 40 pounds corn silage.

All of the cattle eating well, the silage, within a few days from the start, was rapidly increased to as much as would be cleaned up. The concentrates,—cotton seed meal, cold pressed cotton seed, rice bran, and ground milo heads,—were, of course, increased more slowly. None of the cattle were "off feed" at any time during the test, nor were there any of them affected with scours, except in the case of Lot 3, a few of which scoured for a day or two on one occasion when they seemed to

be getting too much rice bran. The cattle of this lot were the only ones that did not eat their feed with a great deal of relish from start to finish. Their failure to do so was evidently due to the rice bran, which, after about two months, became rancid very rapidly. This prevented feeding as much of it from then on as could otherwise have been fed. While fresh, however, it was eaten very satisfactorily.

During a large portion of the test the pens were anything but desirable on account of mud, and especially was this true during the months of December and February, when heavy rains fell every few days, often accompanied by cold north winds.

The average daily rations fed during each period are presented as follows:

First Period—30 Days.

Lot 1. 3.6 pounds cotton seed meal, 46.5 pounds corn silage.

Lot 2. 7.2 pounds cold pressed cotton seed, 43.7 pounds corn silage.

Lot 3. 3.6 pounds cotton seed meal, 36.8 pounds corn silage, 4.6 pounds rice bran.

Lot 4. 3.6 pounds cotton seed meal, 36.8 pounds corn silage, 5.7 pounds ground milo heads.

Lot 5. 3.6 pounds cotton seed meal, 46.5 pounds corn silage.

Second Period—30 Days.

Lot 1. 4.8 pounds cotton seed meal, 50.6 pounds corn silage.

Lot 2. 9.7 pounds cold pressed cotton seed, 42 pounds corn silage.

Lot 3. 4.8 pounds cotton seed meal, 37.4 pounds corn silage, 7.6 pounds rice bran.

Lot 4. 4.8 pounds cotton seed meal, 37.4 pounds corn silage, 9.5 pounds ground milo heads.

Lot 5. 4.8 pounds cotton seed meal, 50.6 pounds corn silage.

Third Period—30 Days.

Lot 1. 5.7 pounds cotton seed meal, 48.3 pounds corn silage.

Lot 2. 11.4 pounds cold pressed cotton seed, 38.6 pounds corn silage.

Lot 3. 5.7 pounds cotton seed meal, 31.4 pounds corn silage, 8.3 pounds rice bran.

Lot 4. 5.7 pounds cotton seed meal, 31 pounds corn silage, 12 pounds ground milo heads.

Lot 5. 5.7 pounds cotton seed meal, 48.3 pounds corn silage.

Fourth Period—30 Days.

Lot 1. 6 pounds cotton seed meal, 50 pounds silage (chiefly sorghum).

Lot 2. 12 pounds cold pressed cotton seed, 36.7 pounds silage (chiefly sorghum).

Lot 3. 6 pounds cotton seed meal, 34 pounds silage (chiefly sorghum), 8 pounds rice bran.

Lot 4. 6 pounds cotton seed meal, 32 pounds silage (chiefly sorghum), 12 pounds ground milo heads.

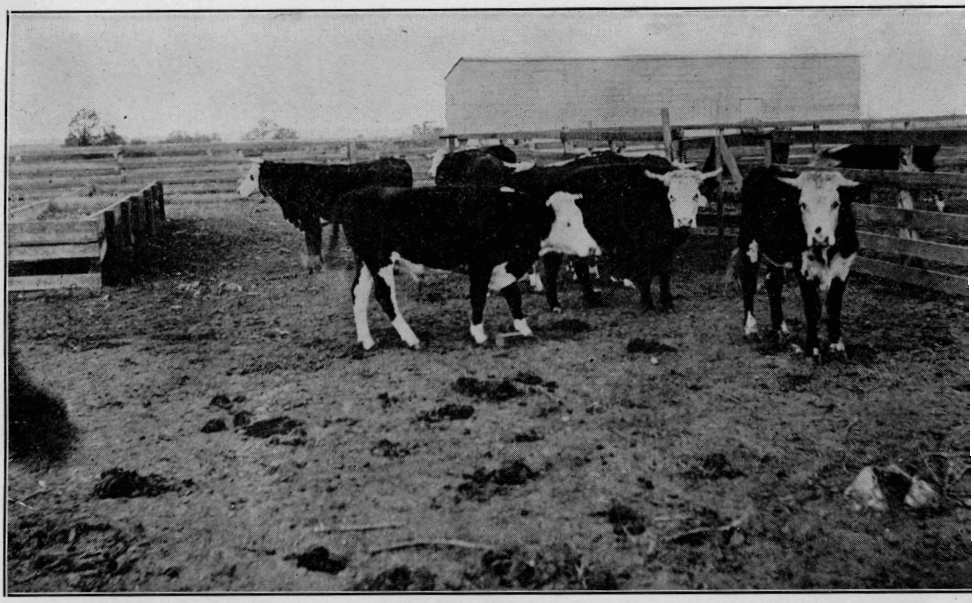

PLATE 3—THE STEERS OF LOT 3 AT THE BEGINNING OF THE EXPERIMENT.

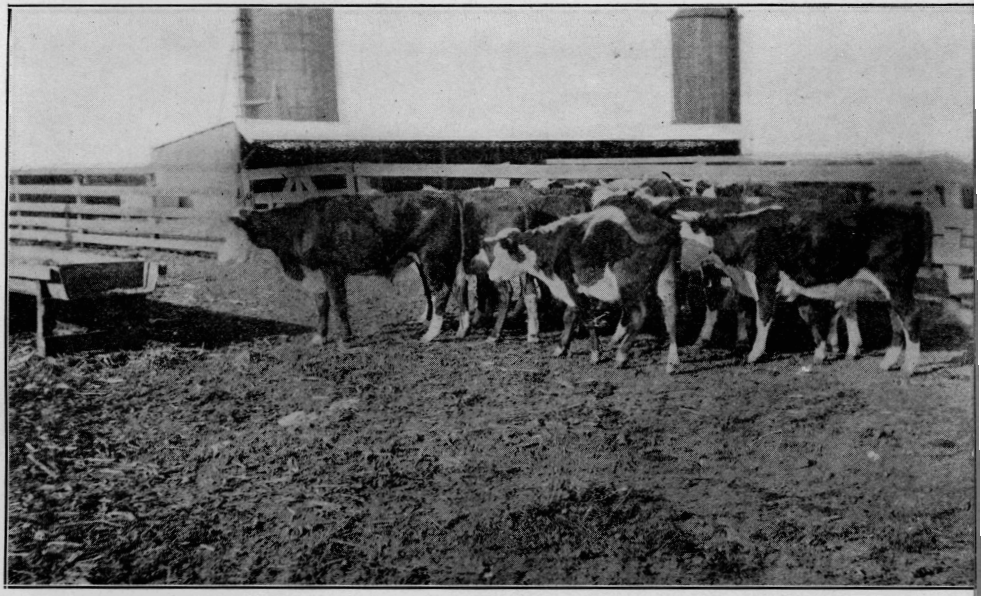

PLATE 4—THE STEERS OF LOT 4 AT THE BEGINNING OF THE EXPERIMENT.

Lot 5. 6 pounds cotton seed meal, 50 pounds silage (chiefly sorghum).

Fifth Period—20 Days.

Lot 1. 6 pounds cotton seed meal, 50 pounds sorghum silage.

Lot 2. 12 pounds cold pressed cotton seed, 35.3 pounds sorghum silage.

Lot 3. 6 pounds cotton seed meal, 35.6 pounds sorghum silage, 6.9 pounds rice bran.

Lot 4. 6 pounds cotton seed meal, 32 pounds sorghum silage, 12 pounds ground milo heads.

Lot 5. 6 pounds cotton seed meal, 50 pounds sorghum silage.

Whole Period—140 Days.

Lot 1. 5.18 pounds cotton seed meal, 49.05 pounds silage.

Lot 2. 10.36 pounds cold pressed cotton seed, 39.5 pounds silage.

Lot 3. 5.18 pounds cotton seed meal, 35.02 pounds silage, 7.11 pounds rice bran.

Lot 4. 5.18 pounds cotton seed meal, 33.98 pounds silage, 10.14 pounds ground milo heads.

Lot 5. 5.18 pounds cotton seed meal, 49.05 pounds silage.

Sorghum silage replaced corn silage during the last fifty days, and, therefore, a statement of the total dry matter, the digestible nutrients, and the nutritive ratio of the rations used, based on the figures shown in Table 2, are presented in two periods, as follows:

TABLE 3.

First Period—90 Days.

Lot No.	Average Ration—lbs.	Dry matter, lbs.	Digestible Nutrients, lbs.			Nutritive Ratio.
			Protein.	Carbo-hydrates.	Fat.	
1	4.72 cotton seed meal	4.314	1.822	.912	.335	
	48.52 corn silage	13.483	.524	7.569	.223	
	Total	17.797	2.346	8.481	.558	1:4.15
2	9.45 cold pressed cotton seed	8.529	1.806	2.561	.711	
	41.46 corn silage	11.521	.447	6.467	.190	
	Total	20.05	2.253	9.028	.901	1:4.9
3	4.72 cotton seed meal	4.314	1.822	.912	.335	
	35.23 corn silage	9.790	.380	5.495	.162	
	6.86 rice bran	6.247	.610	2.783	.708	
	Total	20.351	2.812	9.19	1.205	1:4.23
4	4.72 cotton seed meal	4.314	1.822	.912	.335	
	35.08 corn silage	9.748	.378	5.472	.161	
	9.1 ground milo heads	7.936	.497	5.238	.158	
	Total	21.998	2.697	11.622	.654	1:4.85
5	4.72 cotton seed meal	4.314	1.822	.912	.335	
	48.52 corn silage	13.483	.524	7.569	.223	
	Total	17.797	2.346	8.481	.558	1:4.15

TABLE 4.

Second Period—50 Days.

Lot No.	Average Ration—lbs.	Dry matter lbs.	Digestible Nutrients, lbs.			Nutritive Ratio.
			Protein.	Carbo-hydrates.	Fat.	
1	6 cotton seed meal	5.484	2.316	1.159	.426	
	50 sorghum silage	15.485	.090	8.155	.245	
	Total	20.969	2.406	9.314	.671	1:4.49
2	12 cold pressed cotton seed	10.831	2.294	3.253	.903	
	36.16 sorghum silage	11.198	.065	5.897	.177	
	Total	22.029	2.359	9.150	1.08	1:4.9
3	6 cotton seed meal	5.484	2.316	1.159	.426	
	34.66 sorghum silage	10.734	.062	5.653	.169	
	7.56 rice bran	6.884	.672	3.067	.780	
	Total	23.102	3.050	9.879	1.375	1:4.25
4	6 cottonseed meal	5.484	2.316	1.159	.426	
	32 sorghum silage	9.910	.057	5.219	.156	
	12 ground milo heads	10.465	.656	6.908	.208	
	Total	25.859	3.029	13.286	.79	1:4.97
5	6 cotton seed meal	5.484	2.316	1.159	.426	
	50 sorghum silage	15.485	.090	8,155	,245	
	Total	20.969	2.406	9.314	.671	1:4.49

The Wolff-Lehmann standard for a 1000-pound steer in the latter stages of fattening calls for 26 pounds dry matter, 2.7 pounds digestible protein, 15 pounds digestible carbohydrates, and .7 pound digestible fat, giving a nutritive ratio of 1:6.2. Since the average weight of the cattle for the last 40 days was approximately 1000 pounds, it is possible to gain a very good idea of how the rations used during this period compared with the standard.

The results of the experiment are shown in detail in the following tables:

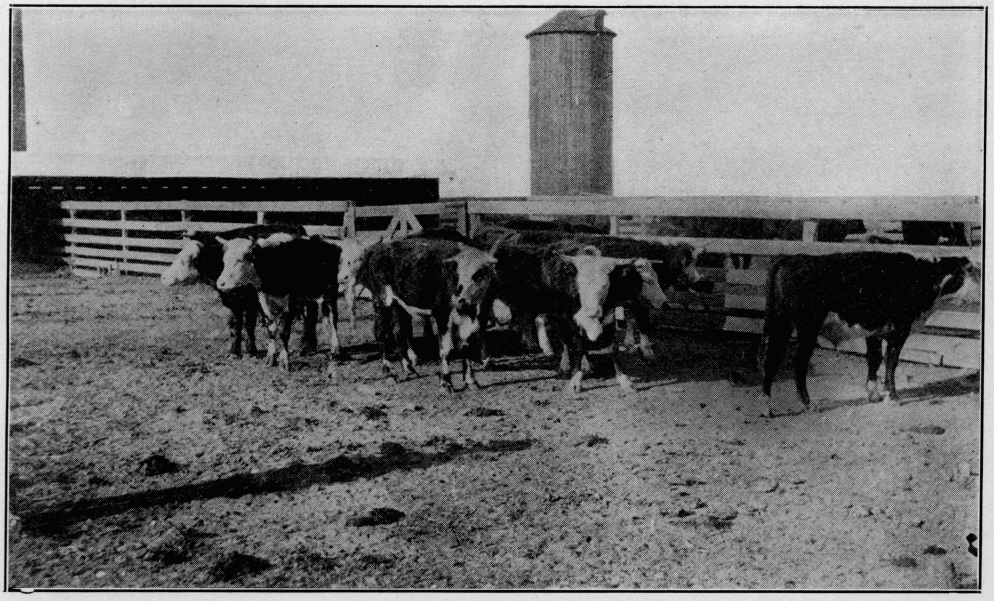

PLATE 5—THE STEERS OF LOT 5 AT THE BEGINNING OF THE EXPERIMENT.

TABLE 5.

Results for First Period of 30 Days.

Lot No.	Number of Steers.	Average Weight Nov. 12, Lbs.	Total Feed Eaten Per Head—Lbs.	Total Gain Per Head, Lbs.	Average Daily Gain Per Head, Lbs.	Pounds Feed Per 100 Pounds Gain.	Cost of Feed Per 100 Lbs. Gain.
1	12	780	108.1 cotton seed meal... 1397 silage.....	70	2.33	154.46 cotton seed meal... 1995.71 silage.....	$5.15
2	12	774	216.2 cold pressed cotton seed. 1312 silage.....	90	3	240.27 cold pressed cotton seed. 1457.77 silage.....	$4.95
3	12	760	108.1 cotton seed meal... 1105.5 silage..... 139.2 rice bran.....	102	3.4	105.92 cotton seed meal... 1082.93 silage..... 136.41 rice bran.....	$4.24
4	12	742	108.1 cotton seed meal... 1105.5 silage..... 173 ground milo heads.	116.4	3.88	92.87 cotton seed meal... 949.6 silage..... 148.64 ground milo heads.	$4.21
5	12	757	108.1 cotton seed meal... 1397 silage.....	92	3.06	117.59 cotton seed meal... 1519.3 silage.....	$3.92

TABLE 6.

Results for Second Period of 30 Days.

Lot No.	Number of Steers.	Average Weight Dec. 12, Lbs.	Total Feed Eaten Per Head—Lbs.	Total Gain Per Head, Lbs.	Average Daily Gain Per Head, Lbs.	Pounds Feed Per 100 Pounds Gain.	Cost of Feed Per 100 Lbs. Gain
1	12	850	146.1 cotton seed meal... 1520 silage.....	36.2	1.2	403.1 cotton seed meal... 4193.1 silage.....	$11.93
2	12	864	292.2 cold pressed cotton seed. 1261 silage.....	49.1	1.63	594.4 cold pressed cotton seed. 2564.74 silage.....	$10.68
3	12	862	146.1 cotton seed meal... 1121.5 silage..... 228.7 rice bran.....	39.5	1.31	369.15 cotton seed meal... 2833.26 silage..... 577.89 rice bran.....	$14.24
4	12	858	146.1 cotton seed meal... 1121.5 silage..... 286.4 ground milo heads.	45.8	1.52	318.81 cotton seed meal... 2446.9 silage..... 625 ground milo heads.	$14.38
5	12	849	146.1 cotton seed meal... 1520 silage.....	26.6	.88	547.96 cotton seed meal... 5700 silage.....	$16.22

TABLE 7.

Results for Third Period of 30 Days.

Lot No.	Number of Steers.	Average Weight Jan. 11, Lbs.	Total Feed Eaten Per Head—Lbs.	Total Gain Per Head, Lbs.	Average Daiy Gain Per Head, Lbs.	Pounds Feed Per 100 Pounds Gain.	Cost of Feed Per 100 Lbs. Gain.
1	12	886	171 cotton seed meal..... 1450 silage.....	73.7	2.45	231.86 cotton seed meal... 1966.1 silage.....	$6.19
2	12	913	342 cold pressed cotton seed. 1159 silage.....	77.5	2.58	441.29 cold pressed cotton seed. 1495.48 silage.....	$7.32
3	12	902	171 cotton seed meal..... 944 silage..... 250 rice bran.....	92	3.06	185.7 cotton seed meal.... 1025.15 silage..... 271.49 rice bran.....	$6.40
4	12	904	171 cotton seed meal..... 931 silage..... 360 ground milo heads...	90.8	3.02	188.25 cotton seed meal... 1024.95 silage..... 396.33 ground milo heads.	$8.13
5	12	876	171 cotton seed meal..... 1450 silage.....	71.2	2.37	240 cotton seed meal.. 2035.08 silage.....	$6.41

TABLE 8.

Results for Fourth Period of 30 Days.

Lot No.	Number of Steers.	Average Weight Feb. 10, Lbs.	Total Feed Eaten Per Head—Lbs.	Total Gain Per Head, Lbs.	Average Daily Gain Per Head, Lbs.	Pounds Feed Per 100 Pounds Gain.	Cost of Feed Per 100 Lbs. Gain.
1	12	960	180 cotton seed meal..... 1500 silage.....	72.9	2.43	246.85 cotton seed meal... 2057.14 silage.....	$6.54
2	12	991	360 cold pressed cotton seed. 1101 silage.....	64.1	2.13	561.03 cold pressed cotton seed. 1715.84 silage.....	$9.02
3	12	994	180 cotton seed meal..... 1020 silage..... 240 rice bran.....	53.3	1.77	337.5 cotton seed meal... 1912.5 silage..... 450 rice bran.....	$11.35
4	12	995	180 cotton seed meal..... 960 silage..... 360 ground milo heads...	68.3	2.27	263.41 cotton seed meal... 1404.87 silage..... 526.82 ground milo heads.	$11.06
5	12	947	180 cotton seed meal..... 1500 silage.....	86.6	2.88	207.69 cotton seed meal... 1730.76 silage.....	$5.50

TABLE 9.

Results for Fifth Period of 20 Days.

Lot No.	Number of Steers.	Average Weight March 12, Lbs.	Total Feed Eaten Per Head—Lbs.	Total Gain Per Head, Lbs.	Average Daily Gain Per Head, Lbs.	Pounds Feed Per 100 Pounds Gain.	Cost of Feed Per 100 Lbs. Gain
1	12	1033	120 cotton seed meal... 1000 silage.....	19.8	.99	605.04 cotton seed meal... 5042.01 silage.....	$16.03
2	12	1055	240 cold pressed cotton seed. 707 silage.....	20	1	1200 cold pressed cotton seed. 3535 silage.....	$19.10
3	12	1047.5	120 cotton seed meal... 713 silage..... 138 rice bran.....	31.5	1.57	380.95 cotton seed meal... 2263 silage..... 438.09 rice bran.....	$12.38
4	12	1063	120 cotton seed meal... 640 silage..... 240 ground milo heads.	21.08	1.05	569.17 cotton seed meal... 3035.57 silage..... 1138.33 ground milo heads.	$23.90
5	12	1033.7	120 cotton seed meal... 1000 silage.....	13.3	.66	900 cotton seed meal... 7500 silage.....	$23.85

TABLE 10.

Results for the Whole Period of 140 Days.

Lot No.	Number of Steers.	Average Weight Nov. 12, Lbs.	Total Feed Eaten Per Head—Lbs.	Total Gain Per Head, Lbs.	Average Daily Gain Per Head, Lbs.	Pounds Feed Per 100 Pounds Gain.	Cost of Feed Per 100 Lbs. Gain
1	12	780	725 cotton seed meal..... 6867 silage.....	272	1.94	266.54 cotton seed meal... 2524.63 silage.....	$7.52
2	12	774	1450 cold pressed cotton seed. 5540 silage.....	301	2.15	481.72 cold pressed cotton seed. 1840.53 silage.....	$8.30
3	12	760	725 cotton seed meal..... 4904 silage..... 996 rice bran.....	319	2.27	227.27 cotton seed meal... 1537.30 silage..... 312.22 rice bran.....	$8.09
4	12	742	725 cotton seed meal..... 4758 silage..... 1419 ground milo heads...	342	2.44	211.98 cotton seed meal... 1391.22 silage..... 414.91 ground milo heads.	$9.20
5	12	757	725 cotton seed meal..... 6867 silage.....	290	2.07	250 cotton seed meal... 2367.93 silage.....	$7.05

MARKETING.

On April 1, 1914, the cattle were shipped to the Fort Worth market. They were driven from the feeding pens to the shipping pens between 10:45 and 11:45 A. M. and were immediately loaded on the cars. They were unloaded at Fort Worth April 2, at 7 A. M., and in order to ascertain their shrinkage from shipping and the fill they would take, they were weighed before receiving water or feed. The data obtained are presented in the following table:

TABLE 11.

Lot No.	Average Weight at College, April 1, 10:45 a. m.	Average Weight Empty at Fort Worth April 2, 8:15 a. m.	Average Shrinkage, Lbs.	Average Final Weight Fort Worth April 2, 1:40 p. m.	Average Fill, Lbs.	Average Net Shrinkage, Lbs.	Net Shrinkage, per cent.
1	1052	944	108	972	28	80	7.6
2	1075	977	98	1018	41	57	5.3
3	1079	977	102	1018	41	61	5.65
4	1084	987	97	1024	37	60	5.53
5	1047	936	111	972	36	75	7.16

SLAUGHTER RECORD.

The cattle were sold to Swift & Co., who kindly furnished us the yields in beef and their estimate of the different lots dressed and in the cooler, the latter being expressed in the following communication:

FORT WORTH, TEXAS, April 8, 1914.

Prof. J. C. Burns, College Station, Texas.

DEAR SIR: Attached you will find statement of yields on five lots of cattle killed April 3rd, which were fed at A. and M. College.

In comparing the relative value of these cattle would place them as follows:

1. Lot No. 4.
2. Lot No. 3.
3. Lot No. 2.
4. Lot No. 1.
5. Lot No. 5.

You understand the requirements of the ideal bullock are thickness in conformation, well covered with fat, which should be evenly distributed, and a bright color both in the fat and lean portions.

In commenting on your several lots, would say that Lot No. 4 is well finished with a very desirable color.

Lot No. 3 is not as well finished as Lot No. 4, not having as much fat, although color is as good.

There is very little to distinguish between Lot No. 2 and Lot No. 1,

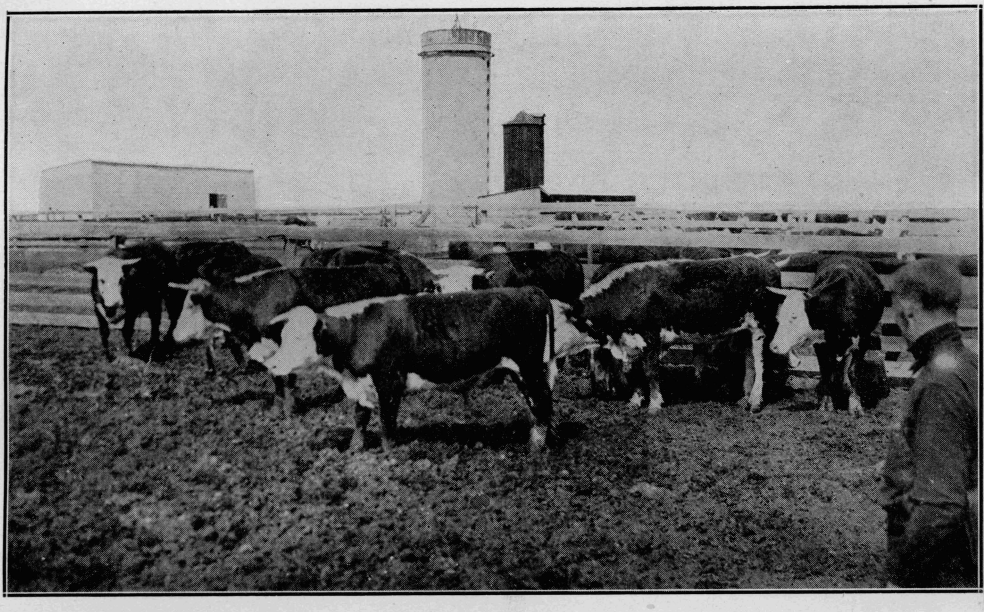

PLATE 6—THE STEERS OF LOT 1 AT THE END OF THE EXPERIMENT.

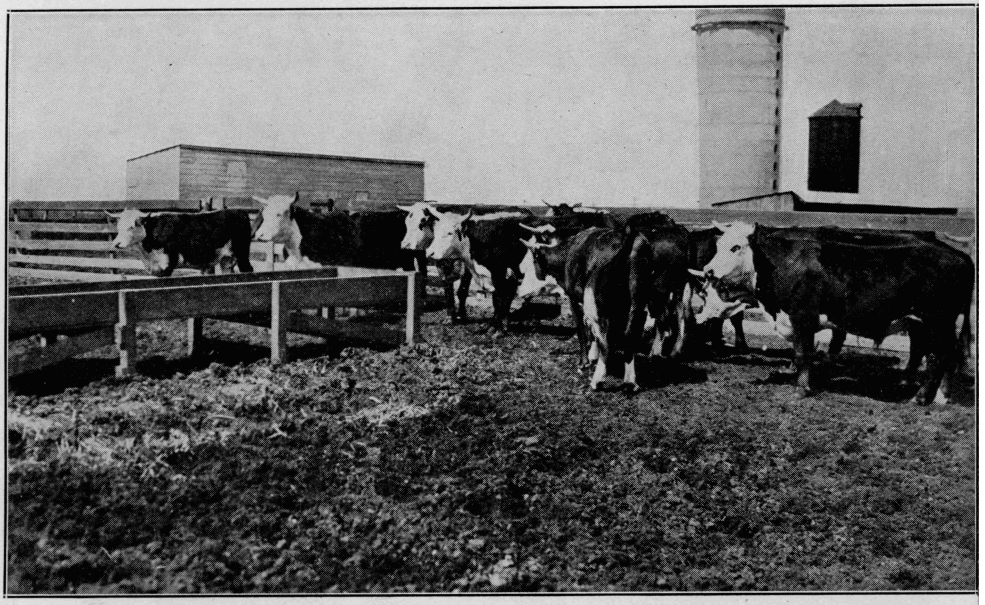

PLATE 7—THE STEERS OF LOT 2 AT THE END OF THE EXPERIMENT.

being practically the same. They have a good color, but not as well finished as Lot. No. 3. Each of these two lots contained two cattle which were below the average.

Lot No. 5 carries fully as much fat as any of the other lots but lacks their color and smoothness.

Yours respectfully,

SWIFT & Co.
Per M. L.

Beef Department ML/AM.

The dressing percentages were as follows:

Lot 1	56.89	per cent.
Lot 2	57.05	per cent.
Lot 3	58.04	per cent.
Lot 4	58.46	per cent.
Lot 5	56.55	per cent.

FINANCIAL STATEMENT.

An itemized statement of the financial results of the experiment is shown in the following table:

TABLE 12.

Lot Number	1	2	3	4	5
Number of steers	12	12	12	12	12
Average weight at beginning of experiment—pounds	780	774	760	742	757
Cost per steer at beginning of experiment at $6.05 per hundred pounds	$47.19	$46.83	$45.98	$44.89	$45.79
Cost of feed consumed per steer during experiment	20.45	24.98	25.82	31.48	20.45
Freight charge per steer in marketing at 17 1-2 cents per hundred pounds	1.70	1.78	1.78	1.79	1.70
Cost of yardage per steer on market	.25	.25	.25	.25	.25
Cost of hay per steer on market	.11	.11	.11	.11	.11
Commission per steer in selling	.50	.50	.50	.50	.50
Total cost per steer	$70.20	$74.45	$74.44	$79.02	$68.80
Selling price per steer	71.44	76.35	77.88	79.36	69.98
Net profit per steer	$ 1.24	$ 1.90	$ 3.44	$ .34	$ 1.18
Prices per hundred pounds for which steers actually sold	$ 7.35	$ 7.50	$ 7.65	$ 7.75	$ 7.20
Prices per hundred pounds necessary to have broken even (hogs not included)	7.22	7.31	7.31	7.71	7.08
Increases in selling prices per hundred pounds above initial cost necessary to have broken even	1.17	1.26	1.26	1.66	1.03
Prices per hundred pounds necessary to have made a profit of $10 per head (hogs not included)	8.25	8.29	8.29	8.69	8.10
Increases in selling prices per hundred pounds above initial cost necessary to have made a profit of $10 per head	2.20	2.24	2.24	2.64	2.05

DISCUSSION OF RESULTS.

Though the cost of the labor and hauling involved in feeding, the cost of the salt consumed, and the value of the manure are not included in the above statement, it is generally found that the value of the

manure will more than offset the other items. When, however, the interest on the investment is taken into consideration there was a loss, though small, on every lot except Lot 3, on which there was still a small profit.

Since, this year, there is an abundant crop of milo and its price is much lower than when this experiment was conducted, it is of interest to note the financial results in the case of Lot 4, with ground milo heads costing $14 instead of $20 a ton. With the other feeds at the prices previously stated the profit on this lot would have been $4.60 a head instead of 34 cents a head.

THE HOGS.

November 19, five shoats were placed in the pen with Lot 3, receiving cotton seed meal, silage, and rice bran, and six shoats were placed in the pen with Lot 4, receiving cotton seed meal, silage, and ground milo heads. The five shoats of Lot 3 weighed, at that time, 350 pounds. February 10, after following the cattle 83 days, they weighed exactly the same as at the start. From then on they were fed additional feed in the form of rice bran and made fairly satisfactory gains. However, practically no returns can be attributed to them since they did no more than maintain their weight while following the steers and receiving no additional feed. The six shoats of Lot 4 weighed, at the start, 445 pounds. With the exception of two head, which died suddenly March 6, evidently from cotton seed meal poisoning, they followed the cattle until March 8, a period of 109 days. The total gain they made, including that of the two that died, was 199 pounds, which, at 7 cents per pound, would have amounted to $13.93. Credited to the steers this would have made the profit from Lot 4, $1.50 a head instead of only 34 cents a head.

On March 8, as neither the shoats of Lot 3 nor those of Lot 4 were doing well, and as further losses seemed evident, they were removed from the cattle feed pens and fed; no losses occurring after the change was made. There is little doubt but that the hogs of Lot 4 would have made much better gains while following the cattle, had the pen not been very muddy a large portion of the time.

GENERAL DISCUSSION.

It should not be out of order at this point to state that occasionally complaints are made of poor results from the feeding of silage. It is found that such results are in most cases due to one or both of two causes, first, the silage having been made from a crop that was not sufficiently mature when placed in the silo, and, second, the silage having been fed without supplementing it with a feed relatively rich in protein, such as cotton seed meal. When a crop of corn, sorghum, kafir, milo or feterita is very green and immature it has not completed the process of building up dry matter and food materials from the soil and air, and, therefore, if placed in the silo at this stage the percentage

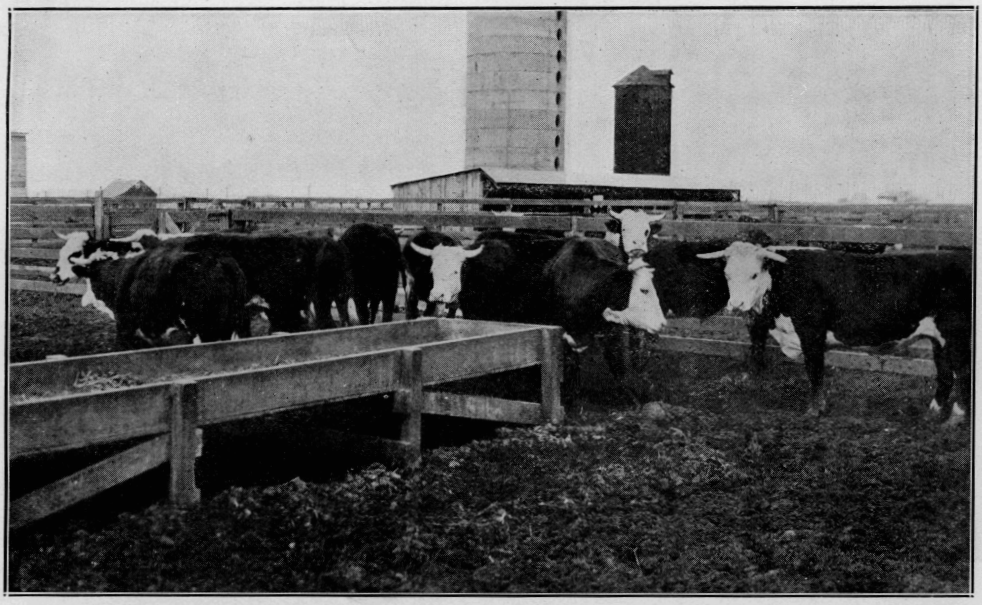

PLATE 8—THE STEERS OF LOT 3 AT THE END OF THE EXPERIMENT.

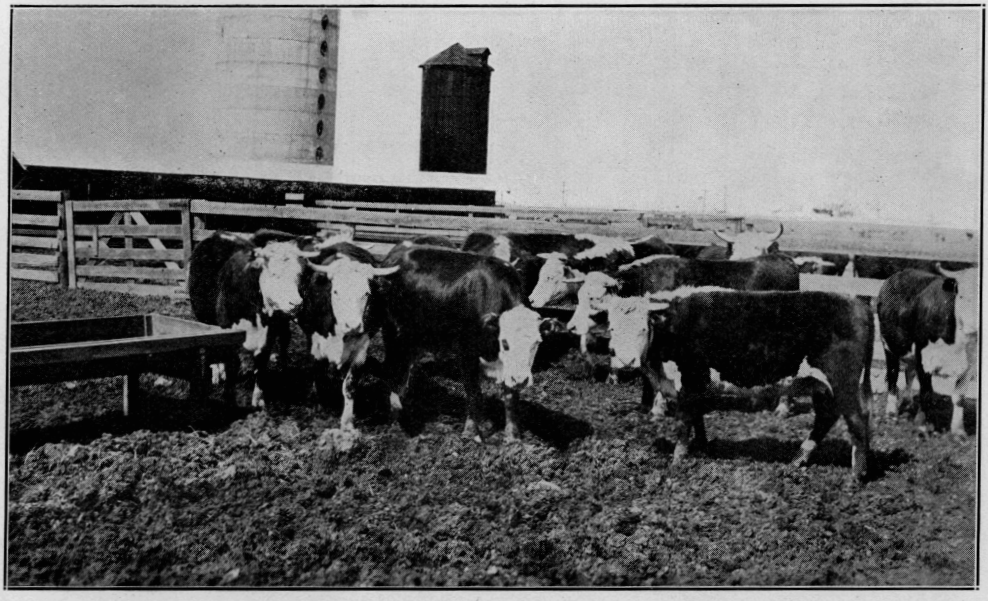

PLATE 9—THE STEERS OF LOT 4 AT THE END OF THE EXPERIMENT.

of water in the silage will be relatively high and the feeding value correspondingly low. The best silage is made when the crop is thoroughly mature and yet sufficiently green to pack well. Even though some of the leaves are dry the crop will still make good silage. Water, in sufficient quantity to cause thorough packing, may always be added if found necessary at the time of filling the silo.

Corn, sorghum, kafir, milo or feterita silage fed alone does not make a satisfactory ration either for growing or fattening animals for the reason that it is deficient in protein, which is necessary for the production of lean meat or muscle and to aid digestion. Some cotton seed meal or cake, which is nearly always our cheapest source of protein, should be fed in connection with it for the best results. The amount of meal or cake to be used will, of course, depend on the class of animals and the purpose for which they are being fed.

That farmers must realize the great value of manure resulting from the feeding of cattle on their lands is becoming more and more evident each year. Every crop removed from the land, when nothing in the way of fertilizer is given to that land in return, means a smaller store of plant food left for the production of future crops and, hence, yields are bound to become less and less.

When cattle are fed on the land on which crops are produced, full value is obtained from the manure, the fertilizing constituents of which amount, on the average, to 90 per cent. of the total fertilizing value of the feeds from which such manure is derived. On the other hand, when feeding is done in pens, not only quite a loss of manure occurs through leaching, even under the most favorable conditions, but if the remainder is to be utilized, there is the expense of hauling it to the fields. Though it is realized that some soils, particularly the clays when wet, may be put in poor physical condition from tramping, yet the above facts certainly emphasize the importance of feeding on the land where the manure is needed, when practicable.

The cow produces on the average 49 pounds of solid excrement and 19 pounds of urine—a total of 68 pounds of manure—daily. This means the production of approximately 4¾ tons during a period of 140 days. This amount of manure at $2.75 a ton, a conservative price when compared with that of commercial fertilizer, would be worth $13.06. Thus, it is again seen just how important it is to save and utilize this manure. It is furthermore seen that, though no profit be realized besides the manure, the farmer can still well afford to feed cattle on his place.

SUMMARY.

1. Based on the selling prices of $7.35 per hundredweight for Lot 1 and $7.50 per hundredweight for Lot 2, cold pressed cotton seed could have cost $23.90 a ton and proved of equal value to cotton seed meal at $28.00 a ton.

2. Rice bran at $16.70 a ton proved profitable in supplementing cotton seed meal and silage and was more profitable for this purpose than ground milo heads at $20.00 a ton. In fact, based on the selling

prices of $7.65 per hundredweight for Lot 3 and $7.75 per hundredweight for Lot 4, rice bran could have cost $22.92 a ton and proved of equal value to the ground milo heads at $20.00 a ton. It was very evident that the milo heads, which contained about 75 per cent. grain, were much more palatable than the rice bran. When the latter is used it is very important that it be fresh and of good quality and that it be fed during the fall and winter months. During warm weather it becomes rancid very quickly and in such condition cattle do not relish it and it deteriorates in feeding value.

3. Based on the final weight at Fort Worth, Lot 5, that had had access to a shed open on the south side, gained 23 pounds a head more than Lot 1, fed in a similar pen without shelter, both having received the same kind and amount of feed. Had Lot 5 sold for $7.35 per hundredweight, the price for which Lot 1 sold, there would have been a difference in profit in its favor of $1.40 a head. The reason Lot 5 sold for a lower price,—$7.20 per hundredweight,—was evidently due to two rather light, inferior steers that it contained, which caused a lack of uniformity in comparison with Lot 1.

4. Lot 4, which had received cotton seed meal, silage, and ground milo heads, made the best gain and showed the best finish. This lot, together with Lots 2 and 3, shrank considerably less than Lots 1 and 5 in being shipped to market.

5. The results with the hogs indicate that there is quite a danger of loss in having them follow cattle that are receiving full rations of cotton seed meal. Previous tests indicate, however, that they may follow, with a fair degree of safety, cattle that are receiving only enough cotton seed meal—3 to 4 pounds for each 1000 pounds of live weight a day—to balance their ration. It is probably true, too, that in feeding grain and in having hogs follow the cattle that the best results will be obtained in feeding only enough cotton seed meal to balance the ration. The rations for Lots 3 and 4 in this test, on account of the full amounts of cotton seed meal fed, were much narrower than the feeding standards for fattening cattle require. On the other hand, the abundance and relative cheapness of cotton seed meal and cake in the South justify the use of narrower rations than are used for fattening cattle in the corn belt.

6. The results of the experiment show very clearly that without a greater margin or spread between the prices for feeders and the prices for fat cattle than was had in this case, there is practically no direct profit in feeding cattle with feeds at the prices herein quoted. The losses incurred by many cattle feeders during the past year have been due largely to insufficient increase in the price of fat cattle over feeder cattle. Either finished cattle must sell for better prices or feeders must be bought cheaper, if there is to be sufficient financial inducement for people to continue or to engage in the cattle feeding business.

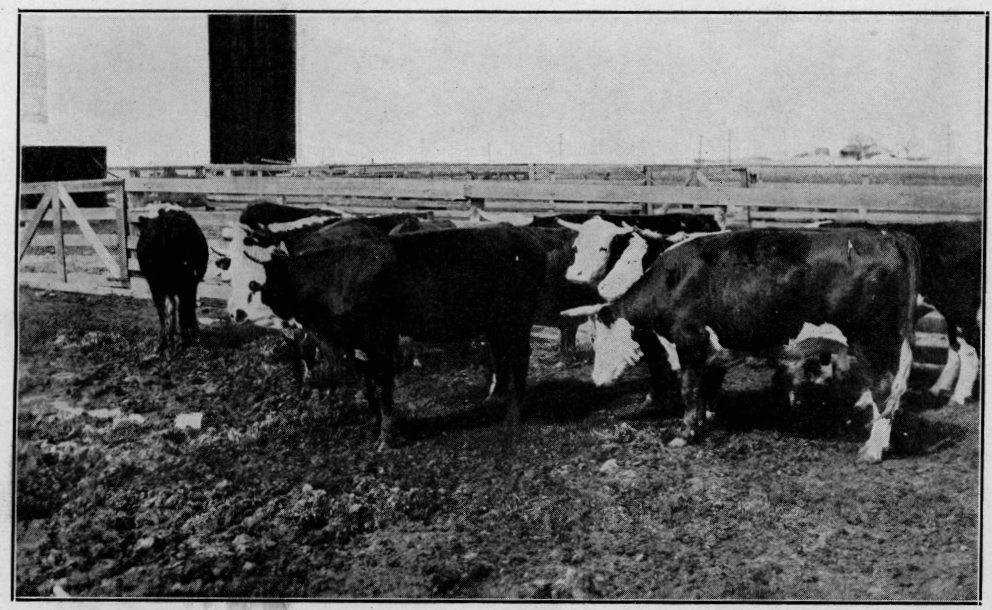

PLATE 10—THE STEERS OF LOT 5 AT THE END OF THE EXPERIMENT.